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(52) Index at acceptance
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(54) BELT GRINDING MACHINE

K5881V/46 =GB 1437-908
Belt grinding machine with workpiece transport - has individual pressure units which can be moved towards the workpiece face
HEESEMANN K 21.04.73-DT-320345
P61 (03.06.76) *DT2320-345 B24b-21/08

The belt griding machine has a motor driven conveyor carrying workpieces, and an endless grinding belt travelling above the conveyor transversely or longitudinally of the workpiece movement. A resilient pressure member keeps the belt against the work and is operated by fluid pressure units, spaced from each other in the movement direction and of single or double acting type. Some of the units are bodily displaceable from the worksurface independent of their movement internally. This allows the support surface to be adapted to concave or convex curved surfaces to be ground. The pressure units are controlled by scanning the workpiece surface of by comparison with templates. 8.4.74 as015446 (9pp)

(71) I, KAR HEES/ Friedenstrasse, 4[illegible] Germany (Fe. Rep hereby declare th[illegible] pray that a patent and the method b[illegible] formed, to be part[illegible] by the following st[illegible]

The present in[illegible] grinding machine o[illegible] grinding plane, con[illegible] surfaces, and co[illegible] conveyor device, su[illegible] or the like, movi[illegible] ground, an endless [illegible] transversely or long[illegible] of movement of the workpieces and located above the conveyor device, and a resilient pressure member, associated with the grinding belt, moving and holding the grinding belt against the surface of the workpiece to be ground by a plurality of pressure units spaced from each other in the direction of movement of the grinding belt and loaded on one or both ends.

Such belt grinding machines, of which various embodiments are known, can grind plate-shaped workpieces having regular or irregular external shapes.

If the workpiece surfaces are not plane, but concave or convex and of small radius, grinding such surfaces involves special problems and the grinding operation must be carried out manually by methods which may be expensive and not particularly effective.

It is an object of the present invention to provide a belt grinding machine of the above mentioned type which makes it possible to grind plane and concave or convex workpiece surfaces the curvature of which is gerater than 1 mm, on workpieces having regular and/or irregular outer shapes such as chair seats, perfectly and fully automatically.

In one form of the present invention, the belt grinding machine is provided with a grinding belt which is adaptable in a simple, reliable and accurate manner, to any particular shape of workpiece surface to be ground.

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[illegible] n there is [illegible] omprising [illegible] rrying the [illegible] s grinding [illegible] or trans- [illegible] ection of [illegible] a resilient [illegible] member which is associated with the grinding belt and which is moved to keep the grinding belt against the workpiece surface to be ground by a plurality of fluid operated piston-and-cylinder pressure units spaced from each other in the direction of movement of the grinding belt and of single or double acting type, wherein at least some pressure units are bodily displaceable towards or away from the workpiece surface independently of the displacement of pressure elements of those pressure units to adapt the pressure member in the form of the workpiece surface, whether concave or convex, to be ground.

In a preferred embodiment, the cylinders are vertically displaceable and are hydraulically operable and are connected by means of a transmission means, preferably a flexible transmission member, such as a Bowden (R.T.M.) cable pressure and traction device, to control members which scans either the actual workpiece surface to be ground, a workpiece surface opposed to the workpiece surface to be ground and having an identical shape, or a template, and translates its movement by the transmission means into a vertical displacement of the hydraulic cylinders; each displaceable hydraulic cylinder has its own control member and transmission means. It is preferable to arrange this control member below the hydraulic cylinder and to form it as a vertically pivotable scanning roller which scans the negative side of the workpiece and to

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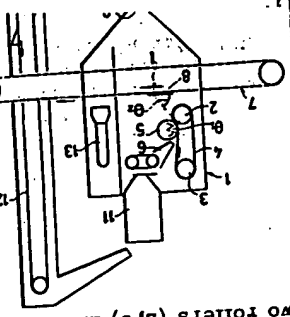

Grit blasting machine - blast is directed onto workpiece feed point between vertical belt and pressure roller
SHOWA DENKO KK 09.08.73-JA-088837
P61 (03.06.76) *DT2438-450 B24c-01 B24c-03/02

The blasting method uses an endless belt (4) supported by two rollers (2, 3) and with a contact roller (5) at a point between. An abrasive feeder (6) has its opening directed at the contact roller, and the object to be blasted (8) is positioned at a distance from this belt on a separate conveyor mechanism (7). The rollers are rotated at high speed whilst the abrasive is fed, and projected at high speed by the momentum of the roller. The contact roller is held against the belt by an adjustable position mounting. A discharge outlet(9)

(71) I, KARL HEESEMANN, of 54 Friedenstrasse, 4970 Oeynhausen-Rehme, Germany (Fe. Rep.); a German national, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention concerns a belt grinding machine or "Linisher" (R.T.M.) for grinding plane, concave or convex workpiece surfaces, and comprising a motor-driven conveyor device, such as endless chains, belts or the like, moving the workpieces to be ground, an endless grinding belt circulating transversely or longitudinally to the direction of movement of the workpieces and located above the conveyor device, and a resilient pressure member, associated with the grinding belt, moving and holding the grinding belt against the surface of the workpiece to be ground by a plurality of pressure units spaced from each other in the direction of movement of the grinding belt and loaded on one or both ends.

Such belt grinding machines, of which various embodiments are known, can grind plate-shaped workpieces having regular or irregular external shapes.

If the workpiece surfaces are not plane, but concave or convex and of small radius, grinding such surfaces involves special problems and the grinding operation must be carried out manually by methods which may be expensive and not particularly effective.

It is an object of the present invention to provide a belt grinding machine of the above mentioned type which makes it possible to grind plane and concave or convex workpiece surfaces the curvature of which is gerater than 1 mm, on workpieces having regular and/or irregular outer shapes such as chair seats, perfectly and fully automatically.

In one form of the present invention, the belt grinding machine is provided with a grinding belt which is adaptable in a simple, reliable and accurate manner, to any particular shape of workpiece surface to be ground.

Furthermore, the grinding belt exerts a uniform specific grinding pressure on the entire grinding surface.

Again, it is proposed, without the use of attachments, to avoid grinding through the edges of the workpiece and to achieve accurate control of the grinding belt position relatively to the workpiece.

According to the present invention there is provided a belt grinding machine comprising a motor-driven conveyor device, carrying the workpieces to be ground, an endless grinding belt travelling above the conveyor transversely or longitudinally of the direction of movement of the workpieces, and a resilient pressure member which is associated with the grinding belt and which is moved to keep the grinding belt against the workpiece surface to be ground by a plurality of fluid operated piston-and-cylinder pressure units spaced from each other in the direction of movement of the grinding belt and of single or double acting type, wherein at least some pressure units are bodily displaceable towards or away from the workpiece surface independently of the displacement of pressure elements of those pressure units to adapt the pressure member in the form of the workpiece surface, whether concave or convex, to be ground.

In a preferred embodiment, the cylinders are vertically displaceable and are hydraulically operable and are connected by means of a transmission means, preferably a flexible transmission member, such as a Bowden (R.T.M.) cable pressure and traction device, to control members which scans either the actual workpiece surface to be ground, a workpiece surface opposed to the workpiece surface to be ground and having an identical shape, or a template, and translates its movement by the transmission means into a vertical displacement of the hydraulic cylinders; each displaceable hydraulic cylinder has its own control member and transmission means. It is preferable to arrange this control member below the hydraulic cylinder and to form it as a vertically pivotable scanning roller which scans the negative side of the workpiece and to

connect it to the housing of the hydraulic cylinder by means of the Bowden (R.T.M.) cable device.

Each hydraulic cylinder is attached to a respective vertically displaceable member, such as a non-rotatable ball race, a second hydraulic cylinder or a rack and pinion, vertically displaceable on a supporting beam carrying all the hydraulic cylinders. The cylinders are provided in a housing, and may be hydraulically double-acting or single-acting with spring return, the piston rod of each cylinder extending downwardly out of the housing where it is connected to the resilient pressure member.

A pressure force normally keeps each piston in a raised position with respect to the pressure member, and the hydraulic fluid when applied, is subject to such a pressure that it moves the piston and, thus the pressure member, downwardly, overcoming any opposing force towards the workpiece surface to be ground so that a uniform pressure and, consequently, a uniform grinding pressure are exerted over the entire area of the pressure member by the hydraulic fluid.

The belt grinding machine of the present invention makes it possible, in a continuous process, to effect fully automatic grinding of plane or concave or convex workpiece surfaces, such as, for example, the surfaces of chair seats.

The workpiece is ground over its entire surface in a single operation, the edges of said workpiece being protected so that a good quality of grind is achieved.

This belt grinding machine is particularly advantageous for high operating speeds so that it has a high output rate of good quality work. The resilient pressure member is adapted to the surface to be ground, according to its shape, in a simple, reliable and accurate manner by individual, vertically displaceable units (single or double-acting hydraulic cylinders, mechanical or motor-driven pressure devices) so that the pressure member is deformed with the grinding belt into the shape of the surface to be ground. All the pressure units (cylinders) exert a uniform force by their pressure member (hydraulic fluid loaded piston) on the grinding belt, so that a uniform predetermined surface pressure is produced over the entire surface of the pressure member.

Due to the vertical displacement of individual pressure units, the pressure member and the grinding belt are exactly shaped to the surface of the workpiece, and the grinding pressure is then produced independently by the members of the pressure units.

The vertical displacement of the hydraulic cylinders is simply and reliably carried out by means of a control member that scans the shape of the surface which corresponds to the surface of the workpiece to be ground, and which is formed by the workpiece itself, such as a matrix or a template, and transmits its movements to the corresponding hydraulic cylinder without loss or delay.

Since the entire pressure beam is deformed in dependence on the shape of the workpiece, accurate surface grinding without rounding or spoiling of the workpiece edges is possible.

An embodiment of the present invention is illustrated in the accompanying drawings, in which:—

Fig. 1 shows a front view of a belt grinding machine,

Fig. 2 shows a longitudinal section through a hydraulic cylinder and associated machine parts taken on the line I—I of Fig. 1,

Fig. 3 shows a longitudinal section through a hydraulic cylinder, taken on the line II—II of Fig. 1 for grinding a plane surface,

Fig. 4 shows a front view of a plurality of adjacent hydraulic cylinders, with a pressure member and a workpiece to be ground, in the lowered and deformed position of the pressure member.

A belt grinding machine according to the present invention for grinding plane and greatly concave or convex plate-like workpieces 10 having regular or irregular outlines such as chair seats, is provided, in a frame 11, with a motor-driven conveyor device 12, which may include two endless chains or a belt continuously moving the workpieces 10 to be ground. The two chains of the conveyor device 12, are arranged to be adjustable in the frame 11 in a horizontal plane relatively to the width of the particular workpiece, and spaced from each other transversely to the direction of travel.

Arranged above this conveyor 12 there is an endless grinding belt 13 circulating transversely to the direction of movement of the workpiece, the belt being driven independently of the conveyor device 12 and held by a resilient pressure beam 14 extending substantially over the entire length of the lower portion of the grinding belt, between the two guide pulleys 15 of the grinding belt, in the grinding position against the workpiece surface 10*a* to be ground.

A plurality of pressure units, in this case hydraulic cylinders 16, 17 are provided spaced apart in the direction of movement of the grinding belt and associated with the pressure member 14. They produce a movement of the pressure member 14 against the surface of the workpiece to be ground and hold it in the grinding position in order to achieve a uniform predetermined grinding pressure over the entire area of the pressure member, and they can also bring the pressure member 14 back to the raised position (no contact between grinding belt 13 and workpiece 10).

Each of the hydraulic cylinders 16, 17 has

a housing 18, 19 which is indirectly supported on the machine base 11 and in which there is a double-acting piston 20 which is connected to a piston rod 21 extending at the workpiece end (lower end) out of the housing 18, 19. This piston 20 is hydraulically (or pneumatically) reciprocated (displaced up and down) and thus the pressure member 14 connected to the piston rod 21 receives the movement in the pressure and raised position.

Each hydraulic cylinder 16, 17 is provided with a supply channel 22, 23 by feeding hydraulic fluid to each cylinder to bring its position to the raised (resting) position of the grinding belt, and a supply channel 24, 25 feeding hydraulic fluid to the piston to bring it to the pressure (working) position of the grinding belt. A solenoid operated control valve 26, feeding the fluid for the grinding pressure to the hydraulic cylinder 16, 17 against the lifting pressure, or evacuating it from the cylinder 16, 17, is inserted in each fluid supply channel 24, 25. Each valve 26 is connected by means of an electric switching and control device, such as an adjustable time delay relay to a scanning member 27, actuating this time relay in dependence on the moving workpiece 10.

Individual hydraulic cylinders 17 may be displaceable (lowerable) towards the surface 10*a* of the workpiece, independently of the displacement of the piston effecting the grinding pressure, thus pre-adapting the pressure member 14 to the surface 10*a* of the workpiece in dependence on the concave or convex surface 10*a* of the workpiece to be ground, so that the pressure member 14 is set to the form of the surface of the workpiece by a vertical displacement of the hydraulic cylinder or cylinders 17, the piston 20 only providing the grinding pressure.

All the hydraulic cylinders 16, 17 are secured to a supporting beam 29 mounted by arms 28 on the machine frame 11 and extending in the direction of movement of the grinding belt. Some cylinders (16) are fixed and others (17) are vertically displaceable.

The pressure member 14 is divided over its length extending in the direction of movement of the grinding belt, into a centre portion grinding a concave section of the surface, and into two end portions (left and right ends) grinding less curved or plane sections. The vertically adjustable hydraulic cylinders 17 are provided in the centre portion, and the fixed hydraulic cylinders 16 being in both end portions. The number of fixed and vertically displaceable hydraulic cylinders 16, 17 may be provided or added as desired.

Two pipes 30, 31 extending one above the other and closed at the ends are mounted on the supporting beam 20. They are hydraulic fluid channels. The upper pipe 30 contains hydraulic fluid for lowering the pressure member, and the lower pipe 31 contains hydraulic fluid for raising the pressure member, the fluid in the pipe 30 being at a higher pressure than that in pipe 31.

The fixed hydraulic cylinders 16 are secured to the hydraulic pipes 30, 31 by screws 32 some of these screws being hollow and establishing a path for the flow of hydraulic fluid from the pipes 30, 31 into the hydraulic cylinders 16. Each screw 32 forms part of a supply duct 22, 24.

The vertically displaceable hydraulic cylinders 17 also receive their hydraulic fluid from the two pipes 30, 31 through flexible tubes 23a, 25a, which extend from each pipe 30, 31 to each hydraulic cylinder supply 23, 25.

The double-acting pistons 20 separate the cylinder housings 18, 19 into a lower chamber 33*a*, with which the supply channel 22, 23 communicates, and into an upper chamber 33*b* with which the supply channel 24, 25 from the valve 26 communicates.

The pressure medium in the lower chamber 33*a* always holds the piston 20 in the upper position determining the raised position of the pressure member.

The lowerable hydraulic cylinders 17 are in driving engagement with control members 34 scanning the surface 10*a* to be ground on the workpiece 10, a workpiece surface 10*b* opposed to the surface 10*a* to be ground and corresponding in shape to the surface 10*o* or a template corresponding to the surface 10*a*, so that a vertical displacement of the hydraulic cylinders 10 and, consequently, of the pressure member 14 is effected according to the movement of the control member. Each hydraulic cylinder 17 is in driving engagement with its own control member 34.

Each hydraulic cylinder 17 is mounted to be reciprocated with its housing 19 at an angle, preferably at a right angle, to the plane of movement of the workpiece on a displaceable member 35. This displacement is parallel to the movements of the piston rods 21 which are also displaceable at an angle, preferably at a right angle, to the plane of movement of the workpiece.

The vertically adjustable member 35 is a non-rotating ball race secured to the supporting beam 29 of the frame. Each hydraulic cylinder 17 has its own ball race 35 which has a guide sleeve 37 which is secured in position in a receiving member 36 mounted on the supporting beam 29 and in which a guide rod 38 connected to the hydraulic cylinder housing 19 is mounted so as to be vertically displaceable but without rotation. This ball race 35 is a preferred adjusting device; however, it is within the scope of the present invention to set the vertical position of each hydraulic cylinder 17 by a second

hydraulic cylinder, a rack and pinion, or any other similar system, instead of using the ball race.

A control member 34 is located below each hydraulic cylinder 17 and includes a scanning roller or pin; the control member 34 may be located above the workpiece 10.

The control member 34 is held with pressure against the shaped surface to be scanned and is connected by a transmission member 39, such as a Bowden (R.T.M.) cable or hydraulic pipe line with the displaceable pistons at the control member end, and at the hydraulic cylinder end, by a lever or rack to the control member 34.

A Bowden (R.T.M.) cable remote control means operating with pressure and traction is preferably used as the flexible transmission member 39. It has a steel strip mounted on balls and the strip is secured at one end to a projecting arm 40 of the hydraulic cylinder housing 19 and at its other end to a lever 41 carrying the control member 34, near the control member. Such a Bowden cable remote control transmission member 39 transmits both pressure and traction forces.

The control member 34 includes a scanning roller 34*a* mounted to rotate on one end of the lever 41, and this lever 41 is mounted to pivot at its other end about an axis 42 which extends parallel to the plane of movement of the workpiece and transversely to the direction of movement of said workpiece; it is mounted on a bracket 43 secured to the frame 11.

A force pivoting the lever 41 in the direction of the surface 10*b* to be scanned, acts on the lever 41 between the scanning roller 34*a* and pivot axis 42. The force is derived from a hydraulic cylinder 44 with a double-acting piston 45 and a piston rod 46 pivoted on the lever 41. The housing 47 of the hydraulic cylinder 44 is provided with two hydraulic fluid connections 48, 49 through which hydraulic fluid flows through the connection 49, urging the piston 45 towards the lever 41 and thus always holding the scanning roller 34 in contact with the underside of the workpiece 10. The other connection 48 evacuates the fluid during the lowering of the cylinders.

Instead of the hydraulic cylinder 44, a compression spring may be provided, said spring urging the lever 41 towards the workpiece.

The compression device formed by the hydraulic cylinder 44 or a compression spring, is mounted on the bracket 43.

The double-acting hydraulic cylinders 16, 17 are replaced in another embodiment (not shown), by single-acting cylinders, the piston 20 thereof being driven by a hydraulic fluid towards the workpiece 10 in the applied pressure position, and into the raised position by an opposing force such as a compression spring. The pressure units 16, 17 may also be pressure devices (pressure units) which are reciprocated mechanically, for example, by springs, or they may be reciprocated by a motor.

Each pressure unit 16, 17 has a vertically displaceable pressure member (displaceable ram) which acts on the pressure member 14.

The scanning roller 27 is mounted on a pivotable lever 50 which co-operates with an eletcric switch which switches the time relay on and off.

All the electrical switching and control devices for the entire operation of the machine are located in a switch box 52 mounted on the machine frame 11.

The pressure beam 14 has a plurality of pressure rams 53 extending transversely to its length and secured to each piston rod 21 with a resilient compression plate 54 (preferably a steel plate) extending over the entire length and width secured to said rams. On this steel plate 54 there is a layer of felt 55, a layer 56 of foam rubber and a second layer of felt 57 which is thinner than the layer of felt 55, adjacent to the steel plate 54, and a sliding mat 58 acting on the grinding belt 13. These parts are connected together to form an elastic unit extending towards the workpiece 10. This elastic pressure beam 14 has described elasticity because of the above mentioned layers.

In an alternative embodiment the pressure beam 14 may be provided with an air-filled cushion which replaces the layers 55 and 56.

The above described belt grinding machine operates as follows:

The workpieces 10 to be ground are moved through the machine by means of the conveyor device 12. All the hydraulic cylinders 16, 17 are first held in an inoperative position by the hydraulic fluid or compression spring acting upwardly on the piston 20, so that the pressure member 14 is disposed above the grinding plane.

When the front edge of the workpiece, in the direction of movement, comes into contact with the scanning roller 27, the roller is swung upwardly by its lever 50 and the switch 51 actuated which then switches on the time relay which in turn actuates the magnetically operated valve 26 coupled thereto; this valve 26 which shuts off the supply 24, 25 in the inoperative position of the pressure member, now releases the flow 24, 25 and a hydraulic fluid can now flow into the chamber 33*b* of each hydraulic cylinder 16, 17 to exert a greater pressure than the opposing force and thereby displace the piston 20 downwardly in the direction of the workpiece 10.

Only the pistons 20 move downwardly

which receive hydraulic fluid under control of their valves 26.

The hydraulic fluid pressure determines the grinding pressure with which the grinding belt 13 is held by the beam 14 against the workpiece surface 10*a* to be ground, and which is uniform over the entire length of the pressure beam. The stroke of the piston 20 in the direction of the workpiece 10 is small, but sufficient for grinding contact with the workpiece 10 to be established with the desired pressure. Plane workpiece surfaces 10*a* are disposed in the region of the fixed hydraulic cylinders 16 and in this case the slight descending movement of the pressure member 14 is only to obtain the necessary grinding pressure.

Concave or convex or mixed concave and convex workpiece surfaces 10*a*, which project by at least 1 mm out of a plane surface, are machined by the other section of the pressure member in which the vertically displaceable hydraulic cylinders 17 are located, said cylinders producing by their additional vertical displacement the shaping of the pressure member 14 to the workpiece surface 10*a* to be ground.

Each scanning roller 34*a* associated with a vertically displaceable hydraulic cylinder 17 scans a shaped surface which is preferably formed by the workpiece surface 10*b* opposed to the surface 10*a* to be ground, and identical in shape. In response to the greater or lesser curvature of this surface 10*b* the the scanning roller 34*a* is pivoted about its pivotal axis 42 and transmits this pivotal movement to the transmission member 39 which effects a vertical displacement of the individual hydraulic cylinders 17 which then deform the pressure beam 14 by their displacements and shape it to the workpiece surface 10*a* to be ground. Grinding pressure from the vertically displaced hydraulic cylinders 17 is applied by their piston rod displacement, effected independently of the vertical displacement by the hydraulic fluid. When the workpiece 10 has passed through under the grinding belt 13, the scanning roller 27 leaves the workpiece 10 and resets the switch 51 which in turn denergizes the time relay and the valve 26 so that the supply of fluid is interrupted and a return flow of fluid simultaneously applied so that the piston rod 21 returns upwardly and the pressure member 14 moves into the raised inoperative position.

As shown, the grinding belt 13 moves transversely to the flow direction of the workpieces 10. However, it is also within the scope of the present invention for the driving belt 13 to move in the direction of travel of the workpieces. The hydraulic cylinders 16, 17 not required in a grinding operation may be switched on or off manually, individually or in groups or automatically switched on or off by elements scanning the workpieces 10.

The scanning of the shape of the workpiece surface 10*a* to be ground may be effected on the reverse side of the workpiece or on a substitute workpiece 10, or on a template located near the grinding area, above or below the plane of movement of the workpiece.

The grinding belt 13 with pressure member 14 and hydraulic cylinders 16, 17 is preferably made as a unit to be vertically adjustable in the machine frame 11 relatively to the plane of contact of the conveyor device 12.

WHAT I CLAIM IS:—

1. A belt grinding machine comprising a motor-driven conveyor device, carrying the workpieces to be ground, an endless grinding belt travelling above the conveyor transversely or longitudinally of the direction of movement of the workpieces, and a resilient pressure member which is associated with the grinding belt and which is moved to keep the grinding belt against the workpiece surface to be ground by a plurality of fluid operated piston-and-cylinder pressure units spaced from each other in the direction of movement of the grinding belt and of single or double acting type, wherein at least some pressure units are bodily displaceable towards or away from the workpiece surface independently of the displacement of pressure elements of those pressure units to adapt the pressure member to the form of the workpiece surface, whether concave or convex, to be ground.

2. A belt grinding machine according to Claim 1, wherein the pressure units are vertically adjustable and each has a control member scanning the surface of the workpiece itself to be ground or a similar workpiece surface or a template.

3. A belt grinding machine according to Claim 2, wherein a vertically displacing member is associated with each of the displaceable pressure units and is located on a supporting beam of the frame of the machine and is a hydraulic cylinder, a ball guide or a rack and pinion.

4. A belt grinding machine according to Claim 3, wherein there is a receiving member secured to the supporting beam of the frame for each vertically displaceable hydraulic cylinder of the displaceable pressure units in which a guide sleeve of a ball guide is secured in position in which a guide member connected to the housing of the hydraulic cylinder can slide but not rotate.

5. A belt grinding machine according to Claim 4, wherein the control member includes a scanning roller or a scanning pin which is held with pressure against the shaped surface to be scanned and which is

connected by a transmission member, such as a cable-like pressure and traction device or hydraulic pipe with a piston at the end of the control member and a further hydraulic cylinder, a lever or a rack and pinion, to the hydraulic cylinder housing.

6. A belt grinding machine according to Claim 5, wherein there is a projecting arm on the housing of each movable hydraulic cylinder, the arm extending transversely to the displacing mechanism of the hydraulic cylinders, on which arm an end of the flexible transmission member is secured.

7. A belt grinding machine according to Claim 6, wherein each scanning roller is mounted to rotate on one end of a lever mounted to pivot about a pivot axis extending from the frame, whilst the other end of the transmission member is secured to the lever near the scanning roller, and a pressure force is applied between the scanning roller and the pivot axis of the lever to hold the lever with scanning roller against the surface to be scanned.

8. A belt grinding machine according to Claim 7, wherein the pivot axis of the lever of the scanning roller is mounted on a bracket secured to the frame.

9. A belt grinding machine according to Claim 8, wherein a scanning roller is provided below each movable hydraulic cylinder.

10. A belt grinding machine according to Claim 9, wherein a hydraulic cylinder holding the lever and scanning roller against the workpiece is provided in a housing with a double-acting piston and a piston rod provided thereon, and pivotably secured to the lever.

11. A belt grinding machine according to Claim 10, wherein the casing of the flexible transmission means is secured to the bracket and the supporting beam.

12. A belt grinding machine according to Claim 13, wherein all the hydraulic cylinders of the pressure units are indirectly connected to a common supporting beam extending in the direction of movement of the grinding belt on the machine frame.

13. A belt grinding machine according to Claim 14, wherein all the double-acting hydraulic cylinders of the pressure units are provided with a piston dividing the housing into two chambers, with a piston rod secured thereto extending out of the housing towards the workpiece and displaceable at right angles to the plane of movement of the piston surfaces of each hydraulic cylinder, each housing being connected to respective hydraulic fluid channels by two supply pipes located adjacent to each other, and from the lower pipe fluid is fed to the lower surface of the piston to hold or bring the piston into a raised position, and from the upper pipe hydraulic fluid of greater pressure is fed to drive the piston down into a working position dependently on the movement of the workpiece, whilst a valve controllable by the workpiece is inserted int the flow of medium for the applied pressure position.

14. A belt grinding machine according to Claim 1 to 13, wherein a further and distinct control member is associated with each hydraulic cylinder, said member being actuated by the front and rear edges of the workpiece in the direction of movement by means of an electrical time delay switch, the valve being actuated by the time relay and mounted on each hydraulic cylinder of the pressure units.

15. A belt grinding machine according to Claim 14, wherein the pressure member has a resilient pressure plate connected to the hydraulic cylinders by means of pressure rams mounted transversely to the longitudinal direction of the piston rods and transversely to the direction of movement of the grinding belt, the plate occupying the entire area of the pressure member, below which plate there are a felt layer, a layer of foam rubber, another felt layer thinner than the felt layer and a sliding mat acting on the grinding belt, said layers forming an elastic unit.

16. A belt grinding machine constructed and arranged to operate substantially as herein described with reference to and as illustrated in the accompanying drawings.

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1437908 COMPLETE SPECIFICATION
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Sheet 1

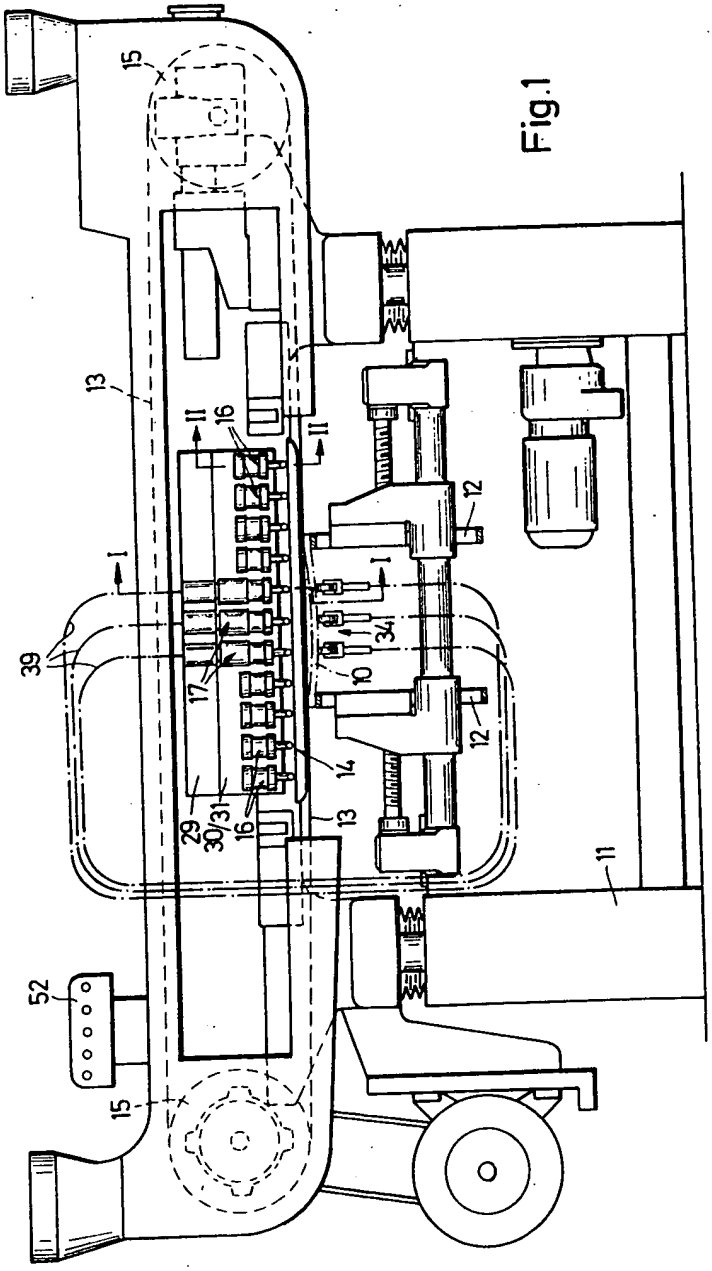

Fig.1

1437908 COMPLETE SPECIFICATION
3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 2

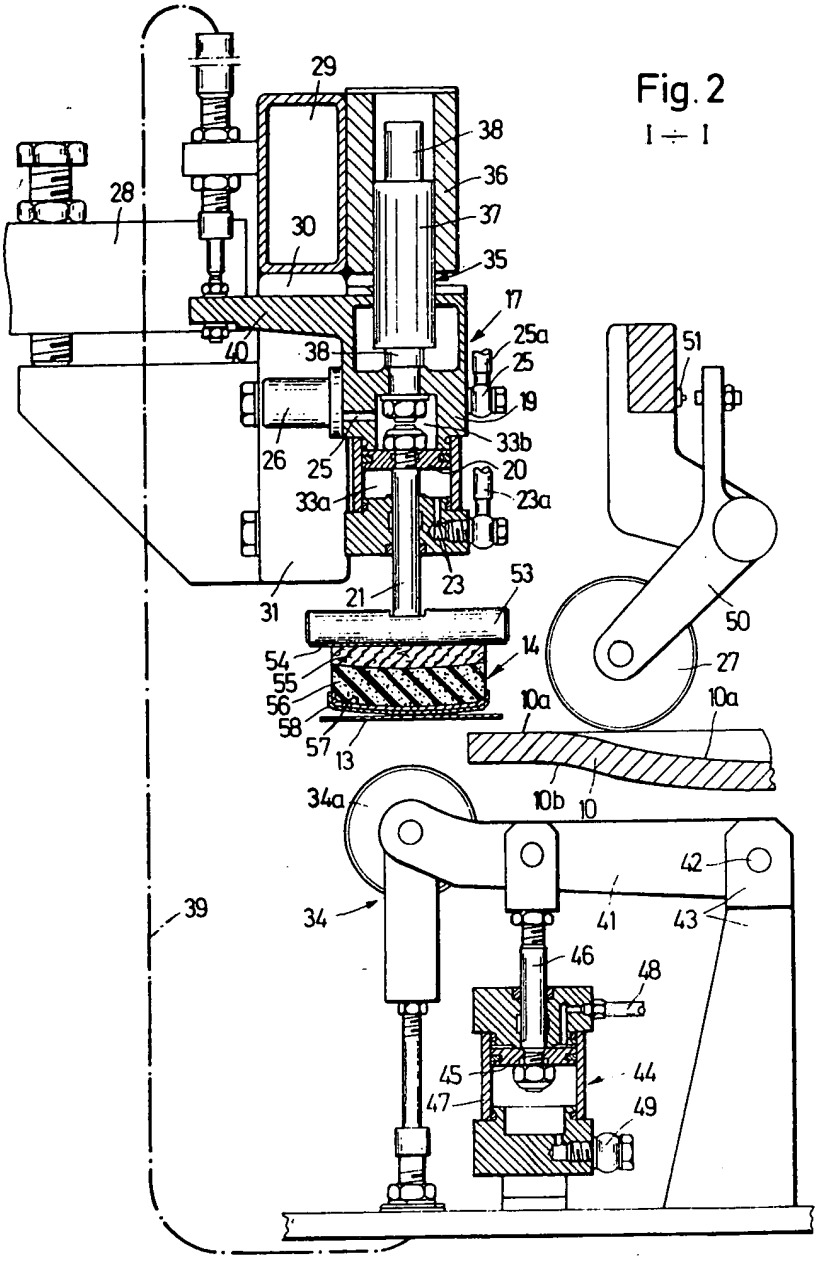

Fig. 2
I – I

1437908 COMPLETE SPECIFICATION
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Fig.3
II ÷ II

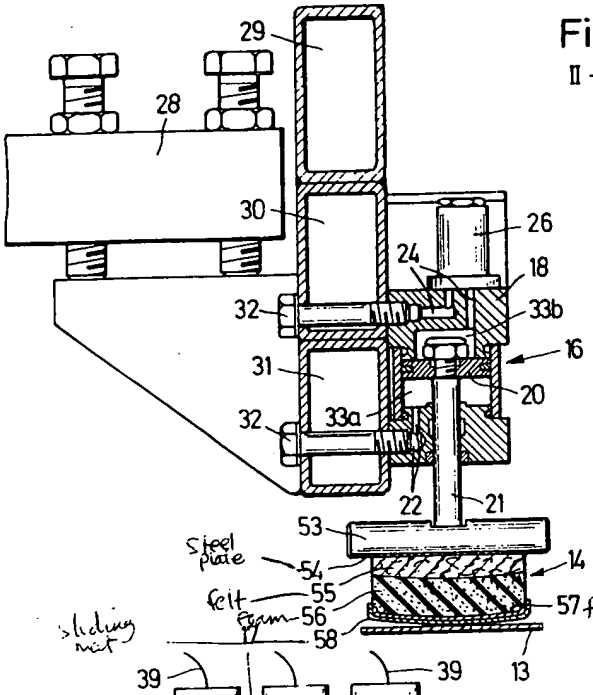

Fig.4